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INTERNATIONAL

APRIL 1954

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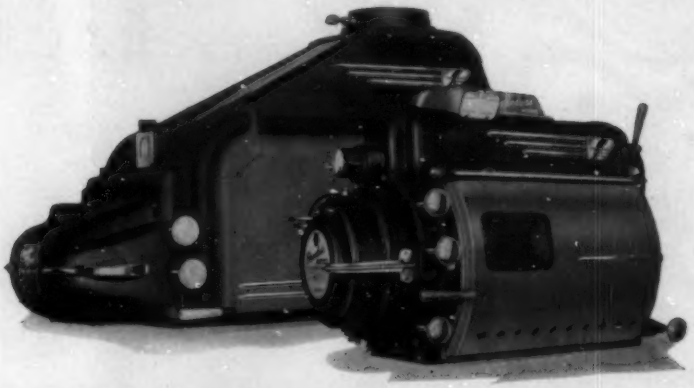

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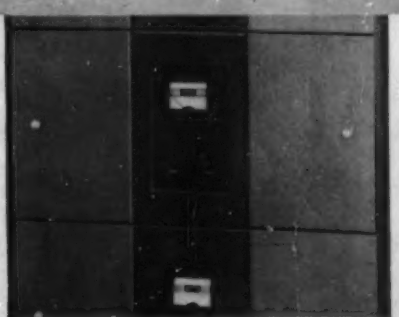

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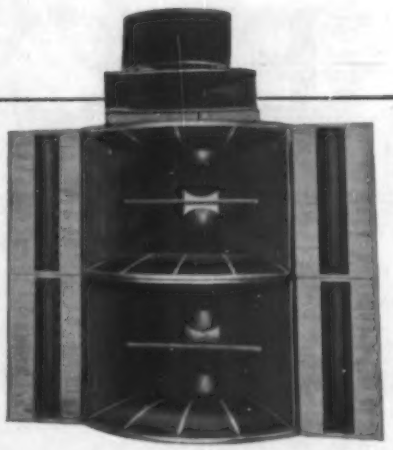

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JAMES J. FINN, *Editor*
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Volume 29 **APRIL 1954** **Number 4**

Index and Monthly Chat	5	IA Obituaries	21
As of the Moment — *James J. Finn*	7	Brush-Up on Fundamentals: Rectifiers for Projection, II	22
Paramount's VistaVision — *Loren Ryder*	13	CinemaScope on 102-Foot Drive-In Screen	23
Ryder Explains Par's Position on Screens	14	What's Your Problem?	24
Proper Method of Splicing CinemaScope Film — *Irving Merkur*	14	Letters to the Editor	24
THE LENS: Key to Projection Quality, III — *Robert A. Mitchell*	15	Proper Procedure for Re-Opening the Drive-In Theatre	26
Polaroid-IP Contest Winner	17	IA Elections	30
In The Spotlight	20	News Notes	
		Technical Hints	
		Miscellaneous Items	

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MONTHLY CHAT

?

Standard 2-D, 3 x 4 pictures

Cinerama

CinemaScope

VistaVision

Variable prismatic anamorphic units for varying ratios

Two-film 3-D

Single-film 3-D beam-splitter (Pola-Lite) with glasses

Single optical track sound

Stereophonic sound, with a mass of amplifiers and speakers

3-D viewing glasses

3-D projection filters

3-D projector interlocks

Varying screen proportions as to both height and width

Seamless screens

Screens with seams

Standard sprockets

Narrow CinemaScope sprockets

Multiple magnetic sound tracks

Single magnetic sound track (wanna bet?)

Curved screens (indeterminate radii)

Flat screens

Triple in-car speakers

?

The foregoing list comprises the muck and mire of the technological swamplands which the harrassed exhibitor is expected to traverse accompanied only by a sharp, persistent fear for his future security. It is also the hazard which demands of the projectionist that he be a hydra-headed, many-tentacled entity with an Einsteinian mind in order to cope with not only the day-to-day changes in projection setups but also the changes within a given program!

These are the technological standards (?) of an industry which once boasted of its position as the fifth largest in the world. This is a situation which can't possibly be anything else but a snide effort precipitated by the industry's so-called executives who wish to retain the plush seats of the mighty and, of course, the emoluments accruing thereto.

If there be even a trace of sanity left in this industry, then in the name of simple, common decency let us exercise it.

J. J. FINN

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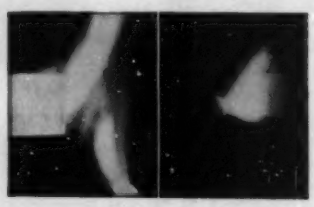

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VOLUME XXIX APRIL 1954 NUMBER 4

As Of The Moment . . .

By JAMES J. FINN

This is another in a series of definitive articles which IP directs to its readers and all those who are interested in the latest technical developments and, consequently, the economic well-being of the industry.

ON THE basis of present developments, 3-D presentation is just floundering around. Maybe Technicolor's astute management will come up with the answer to single-film 3-D projection — and it is hardly conceivable that an organization such as Technicolor would go to any great technical or economic length to prove a point wrong. However successful their efforts, the cruel, inescapable fact remains that analyzers (viewing spectacles) would be required for exhibition purposes — a process which IP has always regarded dubiously.

What Went Wrong?

3-D pictures were mangled on both the production and projection ends. IP can only reiterate those questions which it has posed repeatedly, as follows:

In the 3-D field, did it work out correct 3-D camera methods and correct projection equipment and processes *in advance?*

Did it provide reasonable size reels and enough projectors to handle the job sensibly and without long and unpleasant intermissions?

Did it put good stories into 3-D? And did it furnish acceptable 3-D spectacles for the audience? Were the 3-D pictures on the screen bright enough?

Did the producers enthusiastically support 3-D with their *best* directing, acting, writing, and technical talent?

Did the enthusiastic audience reaction to the handful of, at least, fair 3-D pictures jar the producers into producing more and better 3-D pictures?

Were the problems of the studio, the box-office and of Labor all sympathetically and intelligently considered?

To all these questions, the unfortunate answer is a re-sounding "No!"

In any event, IP can never lend assent to the use of viewing spectacles for motion pictures unless some radical improvement is effected.

Production, Exhibition Values

Cinerama was and is the first really honest effort to deal with a wide-screen picture. Why? Because both in production and in projection they did not cheat on production values, projection, or Labor. It is unfortunate that the economic status of the industry, no less than the deplorable lack of acceptable subject material, militated against the widespread use of this system. Moreover, certain technical deficiencies, including a view of Niagara Falls flowing *upward* when viewed from the balcony, indicate that the structural characteristics of existing theatres are woefully deficient in terms of viewing conditions.

Examining the Record

Now we come again to the CinemaScope process which has the industry in such a dither. It is undoubtedly true that the exhibition of CinemaScope productions has to date resulted in a profit for exhibitors and has given the industry an economic "lift." However, while IP is and always will be interested in the economic health of the industry, its primary task is to convey technical information. To this end IP is of necessity forced to restate its original evaluation of the CinemaScope system, as follows:

1. Historically, there is nothing *new* about Chretien's anamorphic lens. We say this not in a deprecatory sense but only to keep the record straight. Proof of this is readily available by reference to the issue of IP for July 1939, (p. 13) in which a full description of the Chretien anamorphic projection lens, together with an illustration of the "giant" curved screen, was

given (Paris, France, Film Exposition).

C'Scope Proportions Rejected

2. IP is unalterably opposed to the 2.55-to-1 projected picture proportions of the CinemaScope system. This proportion is not only aesthetically incorrect but it provides an image the sweep of which the human eye is incapable of encompassing. Proof to the contrary is invited, especially from 20th Century-Fox.

3. The insistence of 20th Century-Fox upon the use of multiple so-called stereophonic sound tracks is, to our way of thinking, the veriest nonsense. In support of our opinion we offer the accompanying excerpt from a statement by the eminent motion picture critic of the *New York Times*, Mr. Bosley Crowther (January 31, 1954), with which we wholeheartedly agree, and, we are sure, so do countless other moviegoers:

Ear-Splitting Volume

Forgetting the shocking bombardment of multiple-outlet sound that went with the Warner Brothers three-dimensional film, "House of Wax" — which shattering experience, incidentally, is hard to erase from the mind — one still can cite pointed examples of confusion and excessiveness in sound that have been notable in other pictures where the stereophonic feature has been used.

It must be said that a private demonstration, made for a few people here last week, to show the difference between stereophonic and regular single-outlet sound in the crucifixion sequence from "The Robe," did not impress this observer with any overwhelming advantage in the stereophonic device. As a matter of fact, the single-outlet system was more effective.

Confusion the Net Result

In using the stereophonic device to have voices seem to emerge from the screen approximately where the speaking character is, the business of switching from one to another outlet (or alternating the respective volume) as the character moves becomes an obvious mechanical contrivance that confuses the image on the screen. This is so, even when the passage is uniform and smooth. When there is a variation in volume in the different sound tracks, the disturbance is bad.

. . . there remains a question of whether the reproduction of sound, to represent voices or specific noises, is not more uniform and plausible from a single horn.

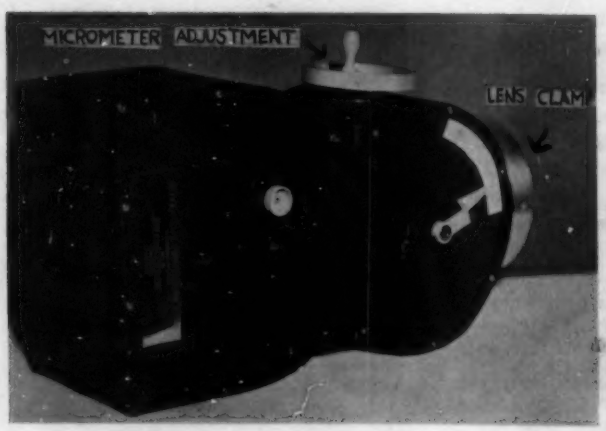
Any sound from outlets away from the screen, however, is superfluous and disillusioning.

Stereophonic sound reproduction, when *properly* applied, would undoubtedly enhance any motion picture presentation, as was fully demonstrated in the "Ave Maria" sequence of Walt Disney's "Fantasia" of blessed memory as an outstanding technical achievement. However, the Hollywood contingent, persisting in their technical ignorance, refuses to insist upon acceptable sound-levels in the theatre.

Auditory perspective is by no means an unknown art, and there comes readily to mind the notable research work done 20 years ago by Dr. Harvey Fletcher, of Bell Telephone Laboratories. These data are available even to the Hollywood technicians who today seem to be reading as they run.

Dramatic Content

Mere *magnitude* of projection screen image as exemplified by the CinemaScope system does not alter one whit the old adage that for entertainment purposes a vital consideration is the *dramatic content* of the picture. The old saying that there can be too much of a good thing may be readily transposed in terms of much too much (screen size) of a *bad* thing.



The Tushinsky prismatic anamorphic lens attachment. This adjustable device is fitted to projection lens in a manner similar to the standard cylindrical type of anamorphic attachment, but can be adjusted to project pictures in a variety of aspect ratios.

In passing, let us not forget that if companies having the industry stature that Paramount and Loew's enjoy are ready to accept the single-optical track system, the method must have some practical merit.

The Fine system (Perspecta Sound) is a sound reproduction process that uses one optical sound track of the standard size and can be adapted for conventional one-channel reproduction, or can also give an effect of stereophonic sound. If no stereo sound is desired, the film need only go through the soundhead in the conventional way. If the theatre be equipped for stereophonic sound, special low-frequency signals, incorporated on the optical track, can cue the sound from the single track to speakers positioned at various parts of the screen.

Prismatic Anamorphoser

There were demonstrated in New York during the latter part of March two prismatic anamorphic lens attachments devised to project motion pictures in any aspect ratio ranging from the conventional 1.33-to-1 up 2.55-to-1 — the Tushinsky lens and the Gottschalk lens.

Such devices are a commonplace in the projection art, having been known and utilized for years in various forms. Prisms are tricky units and involve serious consideration in both their design and application to projection work. The first public demonstrations were given at the RKO 86th Street Theatre in New York under conditions completely under the control of the demonstrators and using *their own film*, all of which was in *color* and of extremely light density. Obviously, such film will pass a much greater amount of light than would a color print of a darker density; and with black-and-white prints the difficulties of light transmission would be pronounced.

Non-Technical Acclaim

These demonstrations met with considerable enthusiasm by a large segment of the industry, and practically the entire trade press went overboard in its acclaim. However, IP is in the projection business, not in the orchid-throwing business, therefore, it arranged for a subsequent *private* demonstration of the Tushinsky device.

At this later private demonstration

(Continued on page 10)

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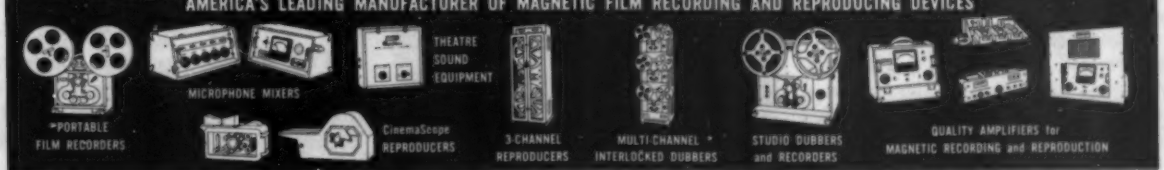

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for IP, the Tushinsky device accomplished the purpose for which it was intended — the showing of motion pictures in *all* aspect ratios within the range mentioned previously. However, at this showing we used a CinemaScope black-and-white test-pattern film, having both horizontal and vertical lines. Alternate projectors were used to show the difference in both focus and light level between the Bausch & Lomb CinemaScope lens and the Tushinsky prismatic attachment.

Considerable Light Loss

Much to our surprise, the focus of the Tushinsky anamorphic attachment was good and in every respect comparable to that attained by the B. & L. CinemaScope lens. But we were surprised to note that as between the B. & L. CinemaScope lens and the Tushinsky unit there was, to our eyes, a light loss with the Tushinsky unit of approximately 45%!

Now, this was rather an astonishing spectacle, since we couldn't conceive how a rather simple prismatic device employing only two optical elements could possibly induce such a large degree of light-transmission loss. In all fairness to Tushinsky, it must be stated that his effective aperture opening was only 3 ¾", while the projection lens was 4" in diameter. This would naturally have the effect of cutting down his light by reason of his reduced "working" aperture. IP understands that a larger effective aperture will be employed in the Tushinsky unit in the very near future to accomodate the present 4" diameter lens mounts. This could make a whale of a difference.

Eminent Optical Opinion

The light loss occasioned by the use of the Tushinsky unit prompted IP to consult eminent optical authorities. Several theories relative to the action of optical anamorphic prisms, and the possible reasons for light loss, were advanced, as follows:

1. The angle at which the light beam strikes the prism may occasion considerable dispersion and absorption of light *within the housing.*

2. The effective aperture of such a device should be fully equal to that of the projection lens so that it can accept the *full* light output from the latter.

3. Extremely accurate positioning of the optical elements within the housing, which is, of course, a mechanical manufacturing procedure.

4. Possible desirability of *matching* the optics of such a unit with those of the projection lens being used.

5. The speed of the regular projection lens would, if of a "fast" character, naturally magnify any inherent errors in the attached unit.

Two Vital Field Problems

There are other factors to be considered in connection with the use of prismatic anamorphic devices such as the Tushinsky unit. First and most important is the *quality* of the glass used. Next is the positioning of the elements within the housing — a question of precision manufacturing procedure.

Once in the field, there arise two vitally important considerations in connection with such devices: first, theatre personnel (managers, projectionists) may attempt to exercise their *personal* preference for picture ratio to the extent that they use a device such as the Tushinsky unit to project a picture in a ratio in which the picture was *not originally made.* Gross distortion will be the inevitable result.

Next, and equally important, is the fundamental necessity for cleaning any optical element. We all know that in a projection room the accumulation of dust on optical surfaces is a deterrent to good projection. This demands that optical surfaces be cleaned frequently, and this applies with especial emphasis to a device such as the Tushinsky prismatic unit.

Granted that projectionists wish to clean the optical surfaces in the Tushinsky unit, the procedure would involve removing the various screws in the housing and wiping off the prismatic lens. What is the warranty that the elements will be subsequently repositioned in proper alignment?

Healthy Competitive Force

With all the foregoing considerations fresh in mind, we regard the introduction of devices such as the Tushinsky unit as a healthy competitive force in the motion picture indus-

(Continued on page 34)

Variable Prismatic Units

1. The angle at which the light beam strikes the prism may occasion considerable dispersion and absorption of light within the housing.
2. The effective aperture of such a device should be fully equal to that of the projection lens so that it can accept the *full* light output from the latter.
3. Extremely accurate positioning of the optical elements within the housing, which is, of course, a mechanical manufacturing procedure.
4. Possible desirability of *matching* the optics of such a unit with those of the projection lens being used.
5. The speed of the regular projection lens would, if of a "fast" character, naturally magnify any inherent errors in the attached unit.

Lens Pre-Focusing Device

A calibrated device which enables the projectionist to pre-focus a variety of different lenses has been designed by Joe Tritsch, member of Los Angeles Local 150 and projectionist at the Encino Theatre, Encino, Calif. Called the "Focuset," it is a simple attachment by which the projectionist may methodically and accurately index different projector lenses in exact focus.

The device consists of a dial indicator type of indexing mechanism attached to the lens holder casting in such a position that the extended or actuating position of the indexing mechanism contacts the main projector frame casting.

In using the unit, a sharp image is first obtained on the screen and the position or reading of the indexing mechanism noted. Every basic position of lenses needed for various aspect ratios may consequently be determined and their position on the indicator noted. These indexing points remain valid for all subsequent lens positioning so long as neither the Focuset mounting nor the main frame casting is varied.

Handy lens pre-focusing device developed by Joe Tritsch, member of IA Local 150, Los Angeles, and projectionist at the Encino Theatre, Encino, Calif.

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Paramount's VistaVision

By LOREN L. RYDER

Engineering Director, Paramount Studios, Hollywood, Calif.

SIMPLICITY is the keyword for VistaVision. This development sets a new pattern in photography and provides a maximum of entertainment value at a minimum of expense. The fact that theatres the world over may utilize its advantages on *standard* projection equipment makes it doubly attractive.

Paramount's consistent belief that wide-screen presentation is enhanced by adding *height* and the need for greater screen clarity prompted the development of this system. The first step was a method of procuring better original photographic detail. This was accomplished by exposing the area of two frames horizontally on regular 35-mm film, the camera being turned on its side.

Larger Camera Negative

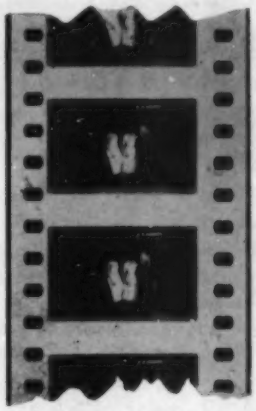
Using a wider-angle lens and pulling eight sprocket holes before the lens instead of the conventional four, a new, large negative measuring 1.472 x 0.997 inches was produced. (Fig. 1). With almost three times the area of a standard 35-mm frame exposed, much more detail was photographed than was possible on a standard frame. Furthermore, scenes can be photographed for best composition in aspect ratios of 1.66 to 1 or 1.85 to 1.

The next step was to get an optical reduction on regular 35-mm film so that it could be shown in any existing theatre without changes in projection equipment. For this a new technique was developed whereby in the printing process the large negative was turned 90 degrees and printed the same as any previous release film (Fig. 2). The net result of such a process meant that the original depth of focus was retained in the reduction and the grain effect was practically eliminated. When projected, the full beauty of the entire scene is reproduced. This is the outstanding feature of VistaVision.

Big Screen Advised

While no added expense is necessary to gain the full quality in VistaVision theatre prints, certain improvements will give greater viewing pleasure and the first and most important is a suitable screen. For those theatres who do not have a big screen, Paramount's recommendation is to provide as high and as wide a screen as the premises will permit.

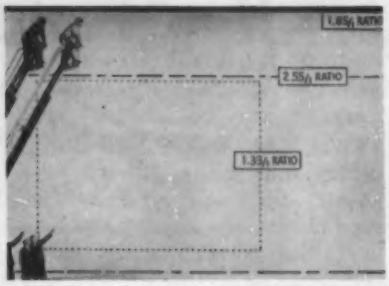
Further, a seamless screen of good quality should be installed and the theatre should *fill the screen with picture*. A first cost for the more advantageous use of Vista-Vision is the screen and with each increment of expenditure better picture quality will result whereby the viewer will see more and get more enjoyment. Good standard lenses and adequate projection light will add to these improvements.



Full-size reproduction of the 35-mm release print made from the double-frame VistaVision negative. Latter is turned 90 degrees and printed down to area shown. Resultant print gives greater resolution.

No Projection Problems

As stated above, a VistaVision release print can be played on any standard projection equipment. Using a standard good quality lens all of the beauty and clarity may be shown in any aspect ratio from 1.33/1 to 2/1 by the simple expedient of masking with a properly shaped projection aperture. (Fig. 3). Light requirements will depend on the screen size and throw.



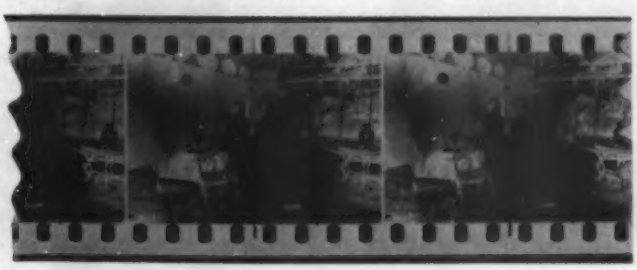
New VistaVision high and wide screen. Dotted line shows how ordinary motion picture screen size compares with big VistaVision screen. Broken lines shows comparison of 2.55 to 1 ratio screen with high 1.85 to 1 VistaVision.

In very large houses with very large screens it might be advisable to use a variable expander prismatic lens. With it, lens handling becomes simplified and complete light is gained for the entire picture of any size. Paramount will make available both standard and compressed prints; the latter will be made in the ratio of 1.5/1 and will give a screen picture in the ratio of 2/1 when shown through the expander lens. Such a lens may also be used with standard prints and in addition will play compressed prints from other studios.

Standard Sound Track

All VistaVision theatre prints will have *standard* sprocket holes and will carry the regular optical sound track. In addition, each print will have a control track which will control the sound placement in theatres equipped for dimensional sound. It is felt that for most houses, the single horn system will give excellent results; however, dimensional sound will be available and optional.

Since the introduction of wide screens many theatres have found that the front seats are even less desirable than in the past. With VistaVision, these seats are regained for the exhibitor for with its exceptional clarity and lack of film grain, pictures down



Full-size reproduction of the VistaVision camera negative showing size and placement of the image. Note clarity of detail.

front can be viewed with comfort. In fact, they will probably be better than ever before and this will be apparent in all theatres regardless of size.

While it has already been said that neither wide screen, 3-D nor stereophonic sound can substitute for a good picture, given a reasonably good production, VistaVision will make it better.

Ryder Explains Par's Position on Screens

IN CONNECTION with this VistaVision "new look," Paramount wishes to re-emphasize the need for bigger and better screens. Exhibitors and paying patrons alike, in every community, are becoming acutely wide-screen conscious, with many such units already installed, but there still are many exhibitors who are undecided on this point.

Paramount feels that it is a distinct advantage to every theatre to install a screen that has *height* as well as width, and where the theatre is capable of accepting it, a screen ratio of 1.85 to 1 is our choice. This would apply to *all* medium and large houses, where we found after a series of tests that the same scene always looks better and the actors can be brought *closer* to the audience as the screen *height* is increased with respect to the width up to the ratio of 1.85 to 1.

Factors Affecting Screen Size

Screen height the same as screen width is usually limited by the proscenium. However, screen height may also be limited in balcony houses by the maximum height that can be seen from the back row of the main floor where the sight line is eclipsed by the overhang of the balcony. In this case it may be necessary to use a screen aspect ratio of 2 to 1.

For houses with smaller screens where the width is limited to 30 feet, but where there is plenty of height, an aspect ratio of 1.66 to 1 is suggested. In the latter case, picture height can be reduced when necessary for good viewing. In all cases the objective is to *fill* the screen with picture.

Screen Light Distribution

It has been found that some screens have been selected to give uniform distribution of light across the house. Our opinion is that such a screen tends to give an inferior picture at the center of seating and seldom improves the side seats.

For large theatres we suggest a metalized seamless screen that has a light gain of 2½ to 1. This type will give much better viewing to the important and largest number of seats and will provide satisfactory light distribution throughout the theatre. Further, the screen should be curved in a radius equal to the production throw.

In long narrow houses the radius could be increased to 1¼ to 1½ times the throw. In addition, where the theatre has a high projection angle, excellent results are obtained by tilting the screen back slightly at the top about ⅓ the projection angle, but not more than 5 degrees.

Paramount Studio Tests

Tests made at the Paramount Studio in Hollywood were shown on a Stewart Trans-Lux Luxuria seamless screen measuring 62½ by 33⅓ feet on which a picture 61 by 33 feet was projected. This was the 1.85 to 1 ratio with a projection throw of 165 feet.

Such a screen could be fitted in only a few houses, but it served to demonstrate the possibilities of clarity, depth of focus, and resolution. On it a VistaVision-produced picture appeared brilliant, with excellent light distribution throughout the house. An improvement was noted too with pictures made on the old standard. They were noticeably better even in the 4 by 3 size.

It can be said, therefore, that where an exhibitor is about to make an outlay for a new screen, we feel that it is wise to invest in a good quality seamless screen. Another reason is that seams tend to divide and separate the picture and become an annoying distraction after awhile.

A new screen of the seamless type will add much to the enjoyment of the patrons.

Proper Method of Splicing CinemaScope Film

By IRVING MERKUR

Ace Electric Manufacturing Co.
Member, IA Local 306, New York City

AT the last meeting of the 25-30 Club of New York City I offered my views on the topic of the proper splicing of CinemaScope film, regarding which there has been considerable comment in projection circles. Appended is a digest of the open, and rather rugged, discussion which ensued at this meeting.

I introduced at this meeting the Griswold "Hot" splicer which I regard as essential for the proper splicing of present-day acetate film. I used Jefrona cement in this demonstration, but I am confident that, with the proper procedure, any good cement will produce equally satisfactory results. I regard the use of a heater element as essential for the satisfactory splicing of acetate film.

Proper Procedure

For safe splicing I recommend the following procedure:

First, place the film in the splicer right-side-up and then cut in the usual manner. Remove the film from the right side of the splicer. Then reverse the film and place it on the left side of the splicer with the magnetic track facing upward.

Next, apply a thin coating of cement to the magnetic side of the film. Let this "set" for at least ten seconds; then carefully wipe off any excess cement. This will remove the magnetic coating and gloss.

For the next step, remove the film and replace it on the right side of the splicer, following which replace the film which was on the left side. Scrape this piece of film dry with the Ace scraper and apply a thin coat of cement. Then close your press plates — and the splice is made to hold securely.

Is is absolutely essential to let the completed splice rest within the press plates for a minimum of 1 minute — *never less*. This gives the cement a chance to penetrate the film and to dry properly. *Never*, under any circumstances, try to squeeze out the cement from the splice, because this will cause the magnetic coating to smear.

Basic Splicing Requisites

The following rules are essential for the making of a good splice for any type of film:

1. Scraping must be clean and not deep.
2. No water should be used.
3. Cement must be applied evenly and sparingly.
4. A good splice will always be made if you raise the left-side plates and apply the cement to the film. Never apply cement to film while it is resting on the cutting bar, as this will cake your cutting edge and make it impossible to get a clean patch.

Many projectionists have experienced difficulty with the splicing of CinemaScope film, and I should appreciate it if any questions arising from this difficulty be submitted to IP.

THE LENS: Key to Projection Quality

Problems that result from the use of fast modern lenses and lenses of short-focal length are described in this third and concluding article of a series. Considered also is a step-by-step procedure for the care and cleaning of projection lenses.

By ROBERT A. MITCHELL

IF WE double the width of a screen-image by halving the focal length of the lens (using a 2½-inch lens in place of a 5-inch lens, for example), the area of the projected picture is increased 4 times. This means that 4 times *more* light is needed to get the same picture-brightness with the 2½-inch lens as was obtained with the 5-inch lens, the speeds of both lenses being the same. This consideration is often overlooked: the exhibitor who buys new short-focus lenses fails to buy new lamps of suitable power to go with them. And the purchase of new lamps usually also entails the purchase of new generators or rectifiers.

Brightness Comes First

This reminder is not meant to discourage the use of shorter focal-length lenses, *but* adequate screen illumination should never be sacrificed for mere picture-bigness. And as slow, rather than fast, lenses in the extremely short-focal lengths are recommended for better image-definition, the need of suitable lamps to accompany the new lenses is all the more urgent.

Specifically, slow and medium lens-speeds (F:3 to F:2.5) are best in the 1½-inch to 3¾-inch focal lengths, fast speeds (F:2 or F:1.9) in the 4-inch and greater focal lengths. Theatres contemplating a change from 5-inch to 4-inch lenses (to increase picture-width from 14.9 feet to 18.5 feet at a 90-foot throw, for example), should obtain coated 4-inch lenses of F:1.9 speed. If the old 5-inch lenses were slower than this, and not coated, new lamps may not be necessary, as the new picture-area is only 1½ times the old area. It depends wholly on whether the lamps gave adequate light with the old lenses.

Coated Lenses

Coated lenses transmit much more light than uncoated ones — 15 to 25 per cent more light. This substantial gain is augmented by the increased speed which can be obtained in modern lenses. All too often, however, the advantages of coated projection-port glasses are overlooked. When both surfaces of these glasses are coated, a gain of about 10 per cent in screen-illumination is obtained. In addition to this positive boost of picture-brightness, coated port glasses assist in the production of more sparkling and lifelike image-contrasts.

The "F-number" speed of a lens is found by dividing its equivalent focal length (E.F.) by the diameter of the "pupil," or clear opening through which light may pass. As an example, a certain lens has an E.F. of 4 inches and an opening of 2.1 inches in diameter. Its speed is F:4/2.1, which equals F:1.9.

Arc Mirror Speed

Theoretically, a lens will intercept all of the light passing through the projector-aperture when its speed matches that of the arc-lamp mirror or condensing lens. We say "theoretically" because the "theory" usually fails to include a mighty important factor, namely, the size of the aperture.

The true optical speeds of arc mirrors and condensers are extremely rapid (in the neighborhood of F:0.4), and are not used in lens-matching calculations. Instead, the mirror is regarded as a lens which images upon the aperture a luminous positive crater placed *infinitely far* behind the mirror! The "working distance" (distance from center of mirror to aperture) then becomes *virtual* focal length. On this assumption, the *virtual* speed of a 12-inch mirror removed 30 inches from the aperture is F:30/12, or F:2.5.

We are allowed to make this assumption because the distance from positive crater to mirror-center ("geometric focus") does not affect the angles of the light-rays when the system is in focus (that is, when the crater is accurately imaged upon the aperture as a brilliant "spot").

All this is simple enough; and such a mirror (virtual speed of F:2.5) will be perfectly matched by an F:2.5 projection lens *if the aperture be a*

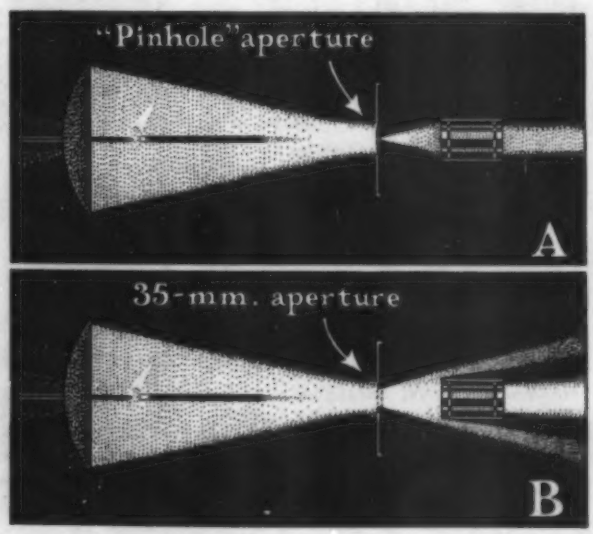


FIGURE 2.

The mirrors and lenses illustrated here have the same "speed"—F:2. The lens in (A) matches the mirror perfectly, but not the lens in (B). The difference is due to the different sizes of the apertures—the larger the film aperture, the faster the lens must be to capture all of the light and thus match the mirror. In actual practice, therefore, an F:2 lens is too slow to match an F:2 mirror.

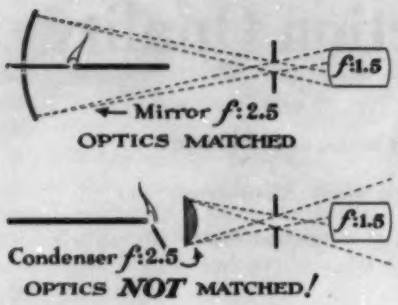


FIG. 3. The closer it is to the aperture, the smaller a mirror or condensing lens must be to have the same speed as a mirror placed farther away. Because of differences in the relation of the size of the aperture to that of the lamp-mirror or condenser, a projection lens which matches one mirror or condenser does not necessarily match another having the same speed.

mere pinhole of infinitesimal dimensions. But projector apertures are not mere pinholes: they are rectangular openings of appreciable size! Here is where we encounter difficulties.

Figure 2 shows how the light spreads out as it emerges from (A) a pinhole aperture and from (B) an actual 35-mm film-aperture having a diagonal of about 1 inch. Notice that the F:2 lens *does not* match the F:2 mirror in the case of a real aperture because there is too much "spreading" of the light rays. The outer rays miss the lens entirely. Therefore, the lens must be *faster* than F:2 if it is to match an F:2 mirror!

Condenser Speed

There is still another peculiarity that appears when we are dealing with real apertures. Condensing lenses, as all projectionists know, are much closer to the aperture than are mirrors. To have the same virtual speed (working distance divided by diameter), a condensing lens need not be nearly as big as a reflector. And regardless of what the working distance may be, an F:2.5 condensing lens matches an F:2.5 projection lens (just as an F:2.5 mirror does) *if the aperture be only a tiny pinhole.*

With a 35-mm film-aperture, however, the small F:2.5 condenser produces a greater spreading of the light-rays from the aperture than does the larger, but more distant, F:2.5 mirror! This is because the diameter of the condenser divided by the diagonal of the aperture is a smaller number than the diameter of the mirror divided by the diagonal of the aperture. (See Fig. 3.) Hence the surprising conclusion: a condenser requires a faster lens for perfect optical match than does a mirror *having the same speed!*

Matching Optics

At this point we seem to be hopelessly entangled in optical complications. Is it possible to calculate the speed of a lens required *to match perfectly* any lamp-mirror or condensing lens? It is possible to do so, most assuredly; though the formula is a bit complex. But before examining this formula, let's review the definition of perfect optical match.

A state of optical match between projection lens and lamp optics exists when the lens has sufficient speed to intercept all of the light emerging from the aperture.

The matching formula which gives the F-number of the lens *(f)* required to match the lamp-optics is:

$$f = \frac{Fm}{bF + a(F + m)}$$

in which *a* is the aperture-diagonal (1 inch), *b* is the diameter of the mirror or condenser in inches, *F* is the E.F. of the projection lens in inches, and *m* is the working distance of the mirror or condenser in inches.*

A complete explanation of this formula and its mathematical derivation may be found in the October 1949 issue of IP, beginning under the heading *The Efficiency Ratio* on page 8.

Although this formula is absolutely correct for simple, single-element projection lenses, and extremely accurate for actual lenses consisting of several elements, its practical value consists solely in revealing that projection lenses must be even faster than the most rapid lenses now available to match perfectly ordinary projection lamps. (See Tables A and B on p. 9 of IP for March 1949.) We may now ask: are the extremely fast lenses needed for perfect optical matching really desirable? No, they certainly are not!

Depth of Focus

It has been shown that fast lenses have a smaller depth of focus than slow lenses. The extremely fast lenses demanded by the perfect matching would be so sensitive to film-flutter and buckle that good focus would be absolutely impossible. The most rapid lenses now available (F:1.9) represent the limit of practicability.

However, when the lens fails to match the optics of the lamp — and this is practically always the case — light is lost and a certain amount of "vignetting," or fadeaway of light at the edges of the picture results. This is one of the causes (but by no means the most important one) of the "hot-spot effect" — a bright central area of the projected picture with fade-away at the edges.

Rays from the edge-zones of a fast mirror diverge so rapidly on the lens-side of the aperture that they may miss the lens entirely, especially when passing close to the edges of the aperture. Rays from the central zone of the mirror, however, are intercepted and utilized by the lens. This makes for hot-spot projection and also increases film-buckling because, whether the rays reach the lens or not, they pass through the film and increase its temperature.

One way to attain optical match without increasing the speed of the lens is to decrease the speed, or diameter, of the mirror. In other words,

(Continued on page 32)

* The distance from mirror (or condenser) to aperture. In the case of a mirror, m in this formula is the length of a straight line parallel to the optical axis drawn from the edge of the mirror to the plane of the aperture. In other words, the mirror is treated as a flat disc instead of the concave surface it really is.

You Can't Stretch Light!

If we double the width of a screen-image by halving the focal length of the lens (using a 2½-inch lens in place of a 5-inch lens, for example), the area of the projected picture is increased 4 times. This means that 4 times more light is needed to get the same picture-brightness with the 2½-inch lens as was obtained with the 5-inch lens, the speeds of both lenses being the same. Adequate screen illumination should never be sacrificed for mere picture-bigness.

Polaroid-IP Contest Winner:

GEORGE A. HARTNETT

Member IA Local 286, Des Moines, Iowa

FIRST prize in the final round of the Polaroid-IP Contest for the best suggestions relative to improved projection of 3-D pictures was copped by George A. Hartnett, member of IA Local 286, Des Moines, Iowa, who conceived and put them into practical operation at the Des Moines Theatre in that city. Hartnett scored over some 60-odd entries.

A Polaroid Land Camera is now being shipped to Mr. Hartnett, who won despite stiff competition from Thomas Cromer, 632 C Ave., West Columbia, S. C., IA Local 347, and John J. Brown, Paramount Theatre, Moncton, N. B., Canada, who were named for honorable mention by the judges, Lewis W. Chubb, research physicist for the Polaroid Corp., and the editorial staff of IP.

Practical Operating Tips

Hartnett was declared the winner on the basis of three suggestions made in his letter. While not spectacular individually, the suggestions cumulatively are practical and very useful ideas for coping with the special problems of 3-D projection.

One Hartnett suggestion is to utilize the support rod which is now installed over the lens, of many projectors to support the weight of the CinemaScope. It was suggested that this rod can be adapted to hold polarizing filters. Another proposal is to fasten polarizing viewers to the front of a pair of small field glasses as an aid in focusing 3-D. The third idea describes a method of unloading oversize reel cans that lessens the danger of strain or injury.

Here is Mr. Hartnett's winning entry:

The following three suggestions for your Polaroid-IP 3-D Contest have been practically applied in our projection room with very satisfactory results.

(1) 3-D Filters

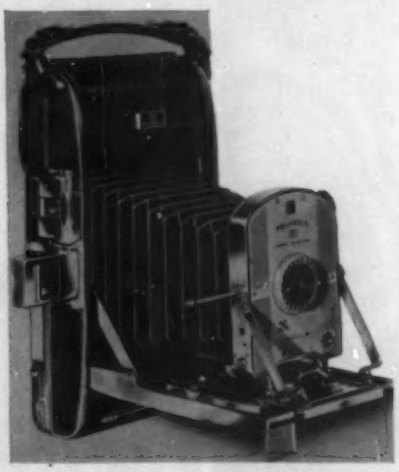
On the front of our Simplex XL projectors are half-inch rods which are located above the lens and extend forward about nine inches. On the front of our CinemaScope lens, which is 19 inches long and quite heavy is a band or collar supporting a roller which rides on this rod and supports the front end of the lens.

Now, when the lens holder screw in the projector is loosened, and with the projector set at an angle, the whole lens assembly would roll forward and right on out the porthole unless held very firmly, a rather difficult thing to do.

To avoid such a mishap, we fashioned two collars out of some old gears which happened to be the right size, grinding off the teeth to make a collar. Fitted with a thumbscrew, the collar may be fastened firmly to the rod up against the roller, holding the lens securelv while the back lens holder screw is loosened.

Now here is how we put this to work to hold our 3-D filters. We made another pair of the collars and to them we fastened our 3-D filter holders. This may be done with glue, solder or small machine screws. The collar is then slipped on the rod, the thumbscrew tightened to hold the filter level and at exactly the same angle as the projector and lens.

When not needed, a quarter or half turn throws the filter up out of the way, where it can be held by tightening the screw and can immediately be flipped again into position for the next 3-D reel. In this way the filter is never dropped or mislaid and is always handy when needed. The assembly may be easily slipped off for cleaning and quickly replaced or stored away until needed again.



Polaroid-Land camera

(2) 3-D Focusing Aids

Because of the double images, maintaining sharp focus is a problem with 3-D. Closing one eye in order to see only one picture does not work well in many cases, and hanging a spare filter in the lookout port also has disadvantages. We purchased two pairs of opera glasses. Over the front lenses of one pair we fitted two of the "left" filters carefully cut from a pair of polarized viewers. We attached the two "right" filters to the other pair. By using the opera glasses with the "left" filters, it is possible to get a closeup of only the left picture, making focusing quick and easy. The other pair of opera glasses is used for the right picture.

(3) 3-D Reel Storage

When attempting to lift a 5,000-foot, 3-D reel from a large film can when it is standing upright, it is often difficult to get a firm grip on the reel and many times it will slip and drop back into the can or onto the floor, resulting in a broken or badly bent reel. I know of one projectionist who dropped such a reel can on his foot, breaking his big toe.

A very simple solution is to lay the large reel can on its edge. The lid will act as a door, easily opened and closed. The reels may be very easily rolled out of or into the cans and can be grasped firmly for carrying to the projector.

IP regrets that this Contest could not be extended for a longer period of time no less than the fact that many of the splendid suggestions received could not have earned an award. It feels, however, that the ideas advanced have been of much benefit to the craft.

Stewart-TransLux Seamless Screen

Increased interest in "seamless" screens as opposed to the types with visible seams joining either horizontal or vertical panels is reported by the Stewart-TransLux Corp., New York, which manufactures large seamless screens, suitable for CinemaScope or other wide screen processes.

The "Luxuria" screen, manufactured by Stewart-Trans-Lux, can be obtained in sizes up to 50 feet high and 90 feet long. These screens are completely perforated to conform to any type of sound system the exhibitor wishes to use. The plastic screen is said to have less tendency than fabric to absorb sound, making possible more efficient sound transmission.

Now all seats are

Watch an audience, as one of today's wide-screen romances unfolds. There's a new feeling of reality—a new sense of being right in the midst of things. And everyone in the house shares it. All of this comes from combined new technics in picture-taking, processing and projection—problems which the Eastman Technical Service for Motion Picture Film is helping the industry solve. Branches at strategic centers. Inquiries invited.

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IN THE

SPOTLIGHT

FINALLY and conclusively the motion picture business has come home — technologically speaking. So long ignored, the very existence of the motion picture business today depends upon the ultimate delivery of the finished product into which has been poured the creative talents of the writer, the producer, the cameraman and his technical associates on the set.

Now, then, comes the financially fateful moment — the final delivery of the finished product to the public which picks up the tab for all the manifold activities of the industry. Simply expressed, this means the box-office.

Time was when the executive studio personnel in Hollywood, while quite aware of the results of the fourth race at Santa Anita, were utterly unaware of what was happening to their product in those outlets, large or small, Broadway or the crossroads, which exercised a profound influence upon their very existence. In effect, they are not confronted with the, to them, dismal spectre of coping with that factor which had never even occurred to them previously — technology.

Now begins the hustle and bustle. Now the grim necessity for facing reality. What is this strange factor, previously ignored, which threatens their empirical status? It is the, to them, depressing but vital necessity for translating at the box-office their so-called "art" into dollars which will ensure their economic survival.

If there be any element of executive sanity left in this industry, *with particular reference to production and exhibition standards,* when will it be exercised?

• Wilfred H. Spicer, member of Local 300, Saskatoon, Canada, makes some very interesting comments in this month's "Letters to the Editor" department about the early days of motion picture exhibition. Spicer is one of the real old-timers in the craft. He started "cranking" machines back in 1908 and spent many years trouping all over the United States and Canada showing pictures in Kinemacolor — the first colored movies shown.

• The 42nd Convention of the IATSE will be held in the Music Hall, Cincinnati, Ohio, during the week beginning August 9 next. Convention headquarters will be at the Netherlands Plaza Hotel.

• Albert S. Johnstone, president of New Orleans Local 293, was appointed 7th IA vice-president, and William Donnelly, business representative of Minneapolis Local 13, was named 8th IA vice-president, to fill the two vacancies caused by the deaths of vice-presidents Roger M. Kennedy, Detroit, and Felix D. Snow, Kansas City. The appointments were made by the IA General Executive Board at its recent semi-annual meeting.

How To Kill A Union

1. DON'T attend meetings.
2. If you do attend, arrive LATE.
3. If the weather isn't pleasant, stay HOME.
4. DON'T accept any office — it's easier to CRITICIZE.
5. NEVER approve anything your Officers of Committees do.
6. DON'T pay your dues until you have to.
7. INSIST upon official notices being sent to you, then DON'T pay any attention to them.
8. DON'T waste any courtesy at a meeting, it's up to your officers to take it.
9. When you DON'T like what's going on, say so, but under no circumstances offer any constructive suggestions.
10. Devote most of your time TALKING; let someone else do the work.
11. Look for hidden motives; DON'T credit Brother Members with any ideals.
12. DON'T co-operate with any Officer of Committees, make them co-operate with you.
13. Remember YOU know more than anyone else about everything. If THEY don't agree with you, THEY ARE WRONG.

Labor News, Worcester, Mass.

• The New York State Association of Motion Picture Projectionists will hold its 1954 Spring meeting on Monday, May 10 at the Moose Club, Hornell, N. Y. At the close of the Association's business sessions, Hornell Local 676 will celebrate its 25th anniversary at a dinner-dance in the ballroom of the Club, to which all the delegates and their guests are invited.

• Minneapolis Local 219 reached a compromise settlement with subsequent-run houses on the issue of pay for preparatory time in the showing of CinemaScope features. The projectionists will be paid for 30 minutes preparatory time, the same as in the first-run houses. Originally the Local had asked for 45 minutes extra time, thus the settlement appears to have been very advantageous for the Local.

• Walter E. Bryner, charter member of Local 323, Springfield, Ill., was presented with a gold life membership card at the Local's recent 40th anniversary celebration.

• Local 434, Peoria-Pekin, Ill., was awarded a judgment of $785 in its suit against Harry C. Runyan, operator of the Luce Theatre in East Peoria. The judgment covers a promissory note held by the Local for $750, plus interest.

• Hartford Local 84 sponsored a two-hour vaudeville revue, headed by Jan Murray, radio and Tv star, the proceeds of which went into its welfare fund. Charles Obert, president of the Local, and Rube Lewis, business representative, were co-chairmen in charge of the affair.

• The officials of Local 287, Beaver Falls, Penna., are negotiating with drive-in theatre owners for a new contract which includes a provision for pay for 15 minutes preparatory time for the projectionists.

• Local 646, Ft. Lauderdale, Fla., has set up a nightly picket line in front of the Fox Drive-In Theatre in nearby

Oakland Park, as a result of the management's refusal to employ union projectionists. The Fox-Drive-In is the only theatre in the Local's jurisdiction not employing IA men.

• A compromise settlement between Vancouver Local 348 and Canadian Famous Players was reached several weeks ago after many months of negotiations. The theatre circuit acceded ot the Local's demand for a wage increase of 25 cents per hour, with most of this increase going into a welfare-pension fund. The Local agreed to the conversion of 10 Famous Players theatres in the province from the two-man to the one-man shift.

• The AF of L Union Industries show which was held several weeks ago at the Pan Pacific Auditorium in Los Angeles drew a record-breaking crowd. The exhibit, staged by the Union Label and Service Trades Department, was officially opened by William F. Schnitzler, AF of L secretary-treasurer.

• Now that Armando Gonzales, member of Corpus Christi Local 604, is the possessor of one of the famous Polaroid-Land cameras which he won for the best contribution in the Pola-

Armando Gonzales, member of Local 604, Corpus Christi, Texas, prize winner in the Polaroid-IP 3-D contest

roid-IP 3-D contest for February, he can add still photos to his hobbies of radio and 8-mm movies. Gonzales, who is 27, has been a member of Local 604 for the past six years and works as projectionist at the Texas Theatre in Kingsville.

• The Hollywood AF of L Film Council has gone on record officially as opposing foreign production of motion pictures by American producers who go abroad to take advantage of cheap labor. It has called upon the U. S. government to use its influence in negotiations with foreign film in-

George J. Flaherty, business representative for Local 165, Hollywood, Calif., has been appointed West Coast representative for the IATSE. He succeeds Roy M. Brewer, who resigned last September. Flaherty has long been active in union affairs and is highly regarded in IA West Coast circles.

dustries "in order to equalize the bargaining power."

Among the IA Locals participating in the Hollywood AF of L Film Council are Studio Projectionists Local 165, Cameramen's Local 659, Laboratory Technicians Local 683, Sound Technicians Local 695, Film Editors Local 776, and Studio Cine Technicians Local 789.

• Last month, in these columns, we mentioned that Nathan D. Golden, director of the Scientific, Motion Picture and Photographic Products Division, U. S. Department of Commerce, was an *honorary* member of Cleveland Local 160. A note from Nat, however, sets us straight on this matter, to wit: "I am not an honorary member of Cleveland Local 160; I am proud to say that I am a regular card-carrying member of that Local." Okay, here you have it.

Incidentally, Golden is now in Cologne, Germany, representing the Department of Commerce at "Photokina 1954," which is the International Photographic Trade Fair and Show.

• *25-30 Club Highlights:* The unusually large turnout which marked the April 8 meeting of the 25-30 Club of Greater New York was due in large measure to the scheduled appearance of Richard M. Altman, optical engineer with the Bausch & Lomb Optical Co., who addressed the gathering on the subject of CinemaScope and the anamorphic lens. At the conclu-

Irving Merkur, member of Local 306, demonstrated at a recent 25-30 Club meeting how to properly splice CinemaScope film with the new Ace-Griswold "hot" splicer

sion of the lecture, Altman and Andy Scheick, B & L's New York representative, held a question and answer session which the members found very interesting and informative. The stereopticon machine used to illustrate the talk was operated by Joe Abrams, member of the Club . . . Tickets for the Club's June 10 dinner at the Grand Street Boys Clubhouse in New York City have been selling like hotcakes. This will be a gala night and many surprises are in store for the guests. Tickets will have to be purchased in advance, as none will be sold the night of the party.

IA OBITUARIES

WAYNE E. SWANK, SR., 55, president of Local 521, Long Beach Calif., died March 27 from a prolonged illness. A member of the Local for the past 32 years, he served in many official capacities. For the past

The late Wayne E. Swank who was a member of Local 521 and its president at the time of his demise.

20 years he had been employed as projectionist at the United Artists Theatre. Wayne was highly regarded by his brother members and his many friends throughout the Alliance. He is survived by his wife, Ruth; a son, Wayne E. Swank, Jr., also a member of the Local, and three sisters.

ROGER M. KENNEDY, 62, IA second vice-president and business representative for Detroit Local 199, died March 19 after a lingering illness. A native of Norwalk, Ohio, he began his career in the entertainment field back in 1906 by working as a projectionist at the old Comique Theatre in Columbus. In 1910 he became of member of Local 194, Indianapolis, Ind., transferring to Detroit Local 199 in 1913. He was elected vice-president of the Detroit Local in 1919, president in 1920, and business representative in 1921, holding the latter office almost continuously until his retirement early this year.

GEORGE H. GOODRICH, 66, member of New York Local 306, died March 23. At the time of his death he was employed at the 8th Street Playhouse in New York. He is survived by his wife and three sons.

SHERIDAN "SHERRY" MCAULEY, 65, member of Local 225, Atlanta, Ga., died in a local hospital on March 14. He worked at the Rialto Theatre for the past 15 years, retiring several months ago because of ill health. He was a veteran of World War I.

Brush-up on Fundamentals

Rectifiers for Projection II

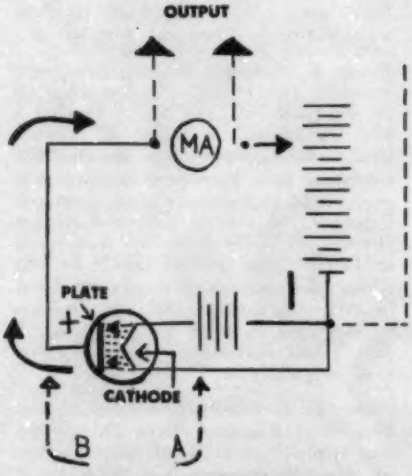
RIGHT NOW and before we get involved any deeper let's consider several questions. For instance, what's selenium? What's a vacuum tube? What's a diode? Most projectionists know the answers but for the benefit of the few who don't we'll let go with capsule definitions on each.

It's a "Valve"

Long ago it was known that if copper plates were heated, really hot till they glowed, then exposed to oxygen until well coated with copper oxide, the plates developed the curious property of letting a current of electricity proceed freely in one direction — and in one direction only. Then it was discovered that a substance, named selenium, if fused to one side of a metal plate in a thin coating, did the same job even better. Both, the copper oxide and the selenium-coated plates, provide the base for dry plate rectifiers.

Vacuum tubes, like all good cathode tubes, depend on thermionic conduction within the tube for their performance. In other words, if the negative cathode is heated it throws off electrons rapidly. Boils them off might be a better way of putting it — and doesn't let them come back. English electronic engineers have a more accurate word for "tube" than we have. They call a vacuum tub a "valve"— and that's precisely what it is. For a rough analogy, think of the valve of an automobile tube — it lets the air go in but won't let it out.

FIGURE 1



HALF-WAVE RECTIFICATION

Diode's Two Elements

Diode tubes have two internal elements, a cathode and a plate. When the cathode is heated by a low voltage (source A, Fig. 1) and the plate at a higher positive potential (source B, Fig. 1) with respect to that of the cathode, the cathode emits electrons which are attracted to the plate. The current flow is in one direction only, from the cathode, which is negative, to the plate, which is positive. This is easily shown by connection of a direct current milliammeter at point "MA" (Fig. 1.).

Since the above is true, if an alternating voltage (dotted lines, Fig. 1) is connected across the cathode and the plate, after the positive plate source "B" has been removed, electrons will flow between cathodes and plate only during that half cycle when the plate is positive. There will be no flow during the half cycle when the plate is negative. Under this condition a diode produces an output of *pulsating* direct current (Fig. 1). It becomes a rectifier converting alternating current to a direct current. However, since the current flows through the rectifier only during every *other* half cycle such a unit is known as a half wave rectifier.

Full wave rectification may be obtained through the use of two or four diodes when connected as shown in Figs. 2 and 3. (The heater source "A" is deleted for simplicity.) For these full wave circuits current flows *every half cycle* instead of for *every other half cycle* as in the case of half wave rectification. Many other connections are possible but the three illustrated with this article are sufficient for our immediate purposes.

Center Tap Rectifier

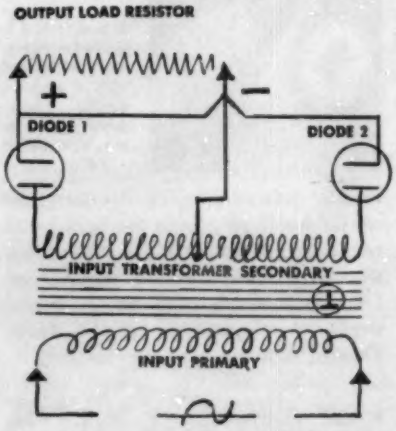
Let's take a look at Fig. 2. In this circuit two diodes are used. When the plate of Diode 1 is charged positively current flows through that tube, then through the load resister (sharp wavy lines) and back to the center tap of the transformer secondary. The positive half cycle for this condition cannot flow through Diode 2 at all since its cathode is positive this time instead of its plate. Thus no conduction can pass through the tube.

Now let's see what happens a tiny fraction of a second later. When the polarity reverses with the next half cycle of the alternating current the opposite end of the transformer secondary becomes positive. This places a positive potential on the plate of Diode 2 which then passes current on through the load resistor and back to the center tap of the transformer. Because of this momentary condition no current can pass through Diode 1 because this time *its* cathode is positive in respect to the plate. With this center-tapped transformer circuit both halves of an incoming cycle become rectified and full wave rectification is obtained.

Bridge Circuits

When the upper end of the secondary winding (Fig. 3) is positive, current flows through Diode 2, through the load of Diode 3, and through that diode returning to the lower end of the secondary winding. All elements are in series and, as the two diode plates receive the positive charge, they conduct. When the lower end of the secondary becomes positive, the condition is reversed. Diode 4 conducts, current passes through the load and impresses the positive charge upon the plate of Diode 1. It in turn conducts and the circuit is completed back to

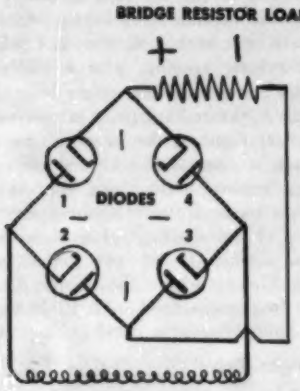
FIGURE 2



CENTER TAP RECTIFIER

the upper end of the secondary winding. Each pair of tubes, connected in series, carries half of the total load

FIGURE 3



current. The resultant rectified waveshape is shown in Fig. 3.

Dry Plate Rectifiers

That "One Way Street" for electric current, just as described for diode vacuum tube rectifiers, may easily be obtained by the use of metallic oxide or dry plate rectifiers. These units can handle heavier traffic and are often substituted for diodes and the same basic circuits may be used. Previously we mentioned the copper oxide rectifiers. Now we'll go into the selenium rectifiers and see what makes them click. The basic elements and one method of assembly are described below.

Aluminum base plates are chemically etched and then electro-plated with a very thin coat of nickel. Highly pure and finely powdered selenium is sprinkled over *one* side of the nickle-plated base plate which is then subjected to a high temperature while under considerable hydraulic pressure. The pressure causes the selenium to adhere to the base plate and starts crystal nucleation. The selenium cell thus formed is oven-baked for crystalization whereupon the selenium is converted to metallic form. This heat treatment forms a very thin oxide barrier on the selenium which acts as a one-way valve during ultimate rectification.

Alloy Over Barrier Surface

A low melting point alloy is sprayed over the barrier surface to serve as a contact for circuit connection. Application of the alloy completes a single rectifier cell which can handle approximately ten volts (varying with the size and type of the unit). For a given unit to handle higher voltages blocking action is increased. This is accomplished by subjecting cells to voltages great enough to cause current to flow in a reverse direction, against the barrier. This electro-forming process requires several hours and stabilizes the final cell for one-way conductivity and blocking characteristics. In final form, then, a selenium rectifier is composed of two metals separated by a semi-conducting barrier.

For heavy duty requirements, such as theatres, cells are stacked and bolted tightly together. These stacks should never become loosened. Series contact from cell to cell requires tightness. Although rugged, these rectifiers should never be subjected to severe physical shock.

[TO BE CONTINUED]

CinemaScope On 102-Foot Drive-In Screen

ONE of the really significant developments in connection with the introduction of the various new projection processes was the installation in the past month of CinemaScope equipment at the Motor Vu Drive-In Theatre in Salt Lake City. This drive-in theatre is now projecting "The Robe" on a screen which is 102 feet wide and 48 feet high.

The entire installation operation was supervised by Service Theatre Supply, Inc., Salt Lake City, with Motiograph representatives participating; while the stereophonic sound installation, the first ever to be made in a drive-in theatre, was handled by Altec Service Corp. engineers.

Two Ashcraft jet-controlled Super-Power projection lamps are used at the Motor-Vu, and according to Harry Swonson, of Service Theatre Supply, despite the difficult problems involved the picture image now being shown is as good as, if not better than the old image which was 70 feet wide by 48 feet high.

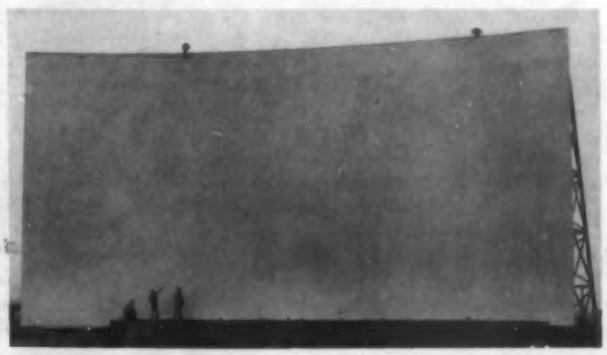
Projection Equipment Used

Two speakers are provided for each car, one hooked to the left side of the car and the other to the right in order to provide a stereophonic effect. The screen is faced with Johns-Manville ¼-inch thick Flexiboard which was given 3 coatings of white Raytone Drive-In theatre screen paint.

In view of the many projection problems that had to be solved in making this installation, the following listing of the projection equipment used may be of interest: two Motiograph AAA projectors; one pair of CinemaScope anamorphic lenses; one pair of Kollmorgen wide-angle lenses; one Robin Imperial 25-horsepower motor generator; two Ashcraft projection lamps, as previously mentioned; two Motiograph penthouse soundheads; two transformers; one pre-amplifier with combining networks; two glass heat filters; 11 film cabinets; 11 amplifiers, and 800 speakers.

Among the technical personnel present for the installation were Frank Riffle and Charles A. Moore, sound technicians from Motiograph.

A subsequent installation of CinemaScope and stereophonic sound equipment was made at the Sky-View Drive-In in Augusta, Ga. The Sky-View's screen is reportedly the world's largest, measuring 120 feet wide by 50 feet high, with the equipment being practically identical with that installed in the Salt Lake City job.



Screen used for the first CinemaScope drive-in presentation at the Motor Vu Drive-In Theatre, Salt Lake City. Enormity of screen, 102 by 48 feet, may be gauged by comparing its range with human figures shown at lower left.

What's Your Problem?

Projectionists whose problems appear below will each receive a $5.00 check from IP. We'd like to know "what's YOUR problem?"

QUESTION: *My theatre will shortly install CinemaScope. I should like to know if there is some reasonably easy method of calculating CinemaScope picture and lens sizes.*

PEDRO ARMANDEZ, Los Angeles, Calif.

ANSWER: There are two approaches to this problem. The first is desirable for making calculations in older theatres where it is not advisable to try to use the projection distance for determining CinemaScope picture and lens sizes. It is very difficult to measure the distance from lens to the screen without appreciable error.

(Symbols used in the formulas below have the following meanings: W = width of CinemaScope picture; w = width of old regular-size picture; f = focal length of old regular-size lens; F = focal length of lens used for CinemaScope.)

For Older Theatres

If the size of the old picture and projection lens is known, width of the CinemaScope picture can be developed from the following formula:

$$W = w \times 2.21$$

If you intend to change the projection lens, and if the size of the new lens is known, you can find the width of the CinemaScope picture in the following manner:

$$W = \frac{w \times 2.21 \times f}{F}$$

To find the projection lens needed in conjunction with the anamorphic attachment for a given size CinemaScope picture, this formula may be used:

$$F = \frac{w \times 2.21 \times f}{W}$$

For New Theatres

At new theatres, where the exact distance from the projection lens to the center of the screen is known, the same information can be obtained a little more easily by the use of slightly different formulas.

(The symbols used in the formulas below have the following meanings: W = width of the CinemaScope picture; D = distance from the projection lens to the center of the screen; F = focal length of lens; H = height of the CinemaScope screen.)

To find the width of the CinemaScope picture if the size of the projection lens and projection distance are known, use this formula:

$$W = \frac{D \times 2 \times 0.912}{F}$$

To find the size of the projection lens needed for a *given* width of CinemaScope picture at a *given* projection distance the following formula may be used:

$$F = \frac{D \times 2 \times 0.912}{W}$$

The height of a CinemaScope picture at *zero* angle of projection is determined as follows:

$$H = W \times 0.392$$

QUESTION: *I wonder if it would be possible for you to give me an idea of what percentage of the 35-mm prints now circulating in this country are on the old nitrate base rather than safety film. By this I mean film that is produced by the motion picture industry for exhibition in theatres today.*

FRANK PEACOCK, Newburgh, N. Y.

ANSWER: It can be said definitely that there are no new films being printed on nitrate base in this country, and that any new release coming from a Hollywood studio would be on safety film base. When a nitrate-base print is received by a projectionist at the present time, it is usually a case where an old picture is being revived (something that is happening more frequently these days because of the shortage of new releases). Also, nitrate prints can be imported from Europe where the nitrate base is still frequently used. "Art" houses in this country receive many such prints.

Nitrate Print Circulation 1%?

Film manufacturers place the amount of nitrate film in circulation in the United States as low as 1% of all film circulating to theatres. It has been remarked that this is a dangerous situation because there is so little nitrate film around that many people who handle film may relax the constant vigilance required to protect workers and public so long as any amount of nitrate film is in circulation, no matter how small. *Always* look at the edge markings!

To the Editor of IP:

In the article "1954 Seen as Biggest Year for Color," by James Morris, in the January issue, the author mentions Kinemacolor. This is the first reference to that process I have seen in a long time. In the old days, I was on the road. all across Canada, and spent some time in New York showing Kinemacolor film. I though that, perhaps, some reminiscence and information might be of interest to projectionists.

Filter Color Composition

It was stated in the article that red and green filters were used. This is essentially correct; really the colors were blue-green and orange-red which were obtained by blending the three primary colors in equal proportions. During projection I used a strip of purple gelatine in the middle of the "red" filter to clear up the white. The general range of colors ran pretty true but the blue of a flag was never a true blue but always a blue-green.

The principle films in 1911 were the coronation of King George V in London, and at a later date the Indian Durbar at Delhi. Among the many subjects were "From Bud to Blossom" which showed the growth of flowers by a series of timed exposures, and "Choosing Wallpaper", where a lady is shown matching wallpaper to fabrics for home decoration, and many scenic films.

One-man Proposition

Trouping with Kinemacolor, although hard work and a one-man proposition, never got monotonous because of the multiplicity of difficulties to be overcome in the various theatres and halls which we played. The predominating trouble was electrical. Everything needed was carried, including a sheet metal booth with angle iron frame, which had to be bolted together. This was later replaced by a tubular framework which, when assembled, was covered with a heavy asbestos cloth. Also carried were over two hundred feet of No. 4 twin cable, about a dozen rheostats, and three motors, one 110 DC, one 110 AC and one 220 AC. Thus equipped, we were supposed to handle any electrical system from 500 DC down.

One problem was the amount of

"juice" required for the arc — at least 100 amps DC and better than 125 amps AC. If we got DC from the street car lines, as we did quite a few times, we had to use five rheostats in series and two or three in multiple series to obtain the necessary amperage. One lead of the 110-volt DC motor had to be plugged into the coils of the rheostat while the arc was burning to get the proper speed. With the heavy AC amperrage and one-inch carbons, the noise was terrible. The lamp was a vertical type and hand-fed. Closely watching the focus and feeding the arc at the same time meant keeping busy.

Regarding the Kinemacolor projecttor, in my opinion it was tops, and I have often wondered why it was never used for standard projection. During a program we used to run some standard film for variation by reducing the speed to sixteen frames per second and removing the color filter. We achieved a remarkably steady picture

WILFRED SPICER
Local 300, Saskatoon, Canada

To the Editor of IP:

I enjoyed your article on film damage in the February issue. Wouldn't it be possible to have more articles of this type which are of much interest to 2-D projectionists? After all, which is more important, 2-D or 3-D? True, you are trying to give projectionists as much information as you can on 3-D, but why overdo it?

I agree with the writer's theory on mutilation of film and the disregard some projectionists have for other projectionists. I couldn't swear to it, but I am quite sure the exchange from which we get our film seldom if ever inspects the film returned from theatres. Also, some inspectors don't know what the score is even if they do inspect it.

It couldn't be otherwise when leaders are patched out of frame or not patched on at the beginning of a picture. Several times the film has come out heads up with the soundtrack on the opposite side, so I have to rewind each reel twice.

ALBERT POWERS
Ashland, Kansas

[We refer Mr. Powers to the lead article in this issue in which we imply that 3-D will receive increasingly less attention, thereby placing new emphasis upon regular 2-D projection in future issues of IP.—ED]

Williams Screen Co. Expands

Added manufacturing space has been acquired by the Williams Screen Co., Akron, Ohio. A new plant on Kenmore Blvd. provides increased production facilities for the Williams all-purpose plastic silver screen.

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Proper Projection Procedure For Re-Opening The Drive-In Theatre

On the sound premise that one needs not so much to be told as to be reminded, IP presents again the appended material which it published originally in April, 1949. These data are particularly appropriate now when feverish activity in terms of new processes is rampant in the drive-in field, particularly the new wide screens.

THE TERM "summer theatre" when used in connection with motion pictures denotes an exhibition operation providing screen entertainment during the summer vacation season. These operations may be divided into three main classes:

1. "Permanent" theatres which are operated only during the summer months because winter operation is unprofitable.

2. "Temporary" motion picture installations, among which are found open-air tents, concert halls, and dance pavilions pressed into service as cinemas.

3. Drive-in theatres.

Drive-in theatres are usually permanent in that the projection equipment is not removed at the close of the season. The "temporary" venture often employs motion pictures as a filler for open dates between concerts and stage shows. The "permanent" type of summer theatre is the most conventional, but the presentations consist largely of first-run, top-quality productions on single-feature bills with selected short subjects.

The operational policy, in general, is conservative and dignified.

Projectionists in most summer-resort theatres are required to close down at the end of the first evening show for an intermission — a convenience for waiting second-show patrons who find that a "preview" of the last few scenes of the feature picture spoils their enjoyment of the show. Starting times of shows are seldom delayed, except in the case of reserved-seat performances.

Reopening Tasks Formidable

A truly formidable number of tasks await the projectionist who must open a theatre which has been closed for a considerable length of time. To neglect any of them is to invite film breaks, light failures, and sound-system troubles. The skill, experience, and reputation of the projectionist are put to the test of preconceived standards from the outset. Failure to achieve acceptable screen results will discredit him. Ample time must be allowed to line up the projection and sound equipment prior to opening.

Certain legal aspects of such operations affect the projectionist and must be considered before anything else. No matter what the type of theatre, its projection facilities must meet the specifications of state and municipal ordnances. Examinations for projection licenses cover the following six points:

1. Handling of the head, lamp, appliances, and wiring of the projection equipment.

2. Practical testing for electrical defects in the lamp and wiring in the projection room.

3. Use of the safety appliances in the projection room.

4. Film-handling regulations.

5. Laws and regulations governing motion picture projection.

6. Projection demonstration in a theatre.

Legal requirements having been met, the projectionist is free to proceed directly to the equipment, and for this work a systematic, step-by-step servicing plan is helpful. It is only by exercising the utmost care in checking and lining up that the projectionist can be sure that all units have been covered thoroughly, and that the all-important opening show will run smoothly and with professional "snap."

The following suggested plan has been devised with the *very worst* conditions in mind. Specific instructions for checking various projector adjustments were outlined in "Notes on Projector Maintenance" (IP for August, 1948, p. 6), hence only the details of systematic inspection and servicing are treated at length in this article. The principal steps of the plan are numbered and headed to facilitate reference.

Inspection, Servicing Plan

1. PRELIMINARY CLEANING. *Do not switch projector motor on at this time!* Dust off the exterior surfaces of each projector, lamp, magazines, head, motor, and pedestal. Wipe the rust-preventive grease from all exterior and interior parts, and remove rust spots with a small cloth wet with kerosene. Dry thoroughly, apply a thin film of projector oil to the parts cleaned, and

Warning: Correct Width of Adjustable Shutter Blades

Shutters having blades of adjustable width need special attention. It has been stated incorrectly in a well-known textbook on projection that the lens may be about one-third open when the intermittent sprocket starts to move and the same distance open when the sprocket comes to rest, *without affecting the screen image.*

This inconceivably bad practice is advocated as an effective measure for increasing screen illumination.

Actual projection tests prove that the extra illumination amounts to only 2 or 3%—an amount imperceptible to the average eye. The really important effect, however, is the introduction of an annoying *rapid trembling* of the edges of all bright objects in the screen image.

We are forced to conclude, therefore, that the occulation of the film image must be positively of sufficient duration to keep the screen dark during the entire interval of the film movement in the gate. It is decidedly better to have the blades a trifle too wide than too narrow.

again wipe dry. (Do not use cotton mechanic's waste for cleaning projectors.)

2. Cleaning Drives and Gears. Attention will now be directed to the drive side of the machine. Remove excess oil from the mechanism and soundhead, using a medicine dropper to drain off oil pools; afterward clean rags. Scrub off accumulations of grime from the gears with a stiff-bristled toothbrush dipped in kerosene. Be sure to wipe the kerosene off afterward. Check all machine screws and taper-pins. This is the time to requisition gears and other parts which need to be replaced. *Do not oil the projector yet.*

3. Checking the Intermittent Test the intermittent sprocket for end-play and backlash when in the locked position. Note the "feel" of the mechanism when the machine is turned by hand. If there are no evidences of binding, the motor may be run for short periods. With the machine running, listen carefully to the intermittent movement *with the film gate open.* A noisy intermittent unit must be taken out of the head, carefully examined for wear, and adjusted for noiseless, rock-steady operation.

Checking Film Path

4. Checking the Film Course. Remove the upper magazine. Clean thoroughly all parts of the film side of the projection and sound heads, using kerosene as a cleaning agent. Carbon tetrachloride may be used to loosen stubborn dirt deposits. A quantity of clean rags, a toothbrush, and copper-wire probe are indispensable. The gate door, the aperture plate, and the projection lens should be taken out, and the lens carefully placed in the cabinet for cleaning at a later time.

Check all sprockets for worn or burred teeth. The intermittent and sound sprockets are likely to be the worst, as these are the most difficult to remove. Reverse or, better, *replace* sprockets having worn teeth.

Examine idlers and pad rollers for wear *and adjustment.* The lateral and clearance adjustments of pad rollers are sufficiently important to warrant a review of maintenance notes thereon.

Thread a short strip of new film over the sprocket. Open and close the pad roller several times rather sharply. Remove the film strip and examine its edges at the place where

it was on the sprocket. If an edge is found to be nicked or roughened, loosen the set-screw and move the pad-roller arm in or out, as required, and tighten. Repeat the test until a position is found where the edges of the film are not injured by opening and closing the pad roller.

Double-Film Test

Thread the sprocket with *two* thicknesses of film and close the pad roller. Adjust the stop-screw until the point is reached where the two thicknesses of film are only very slightly loose in the sprocket with the pad roller closed. Then tighten the locknut.

Clean the aperture plate and gate door, adjust the tension of the pressure pads, if necessary, and return these parts to the machine. A thin film of heavy petrolatum may be rubbed on the film tracks and pressure pads. (Oil should not be used in the gate, as heat will vaporize it and fog the lens.)

The gates of old-style soundheads and the takeoff drums of newer models may now be cleaned. Petrolatum is unnecessary here. The focus of the optical tube should not be disturbed if this is known to be correct. (More anon concerning this point.)

Check the alignment of the intermittent sprocket shoe by slowly closing the gate while the projector is running. If a loud intermittent sound is heard only when the gate is closed, adjustments are necessary.

Lateral Guide Rollers

Examine the lateral guide rollers for condition and cleanliness, but the adjustment of these must wait until the picture projection test is made. Clean and correct the position of sprocket strippers.

Finally, thread up a 10-foot length of film — preferably a strip containing several wide and badly buckled splices — and run down slowly *by hand*, noting the action of the loops and the passage of the film over the sprockets. Correct any faults which may be revealed by this test.

5. Upper Magazine. The upper magazine should be overhauled before replacement of the projector. Take the assembly completely apart, clean and oil the spindle shaft, then reassemble. Clean the fire-valve rollers. Put the magazine back on the machine in correct alignment with the head. Check the assembly by placing an empty 2000-foot reel in the upper magazine and turning it while pressing it on the edge of the reel. Scraping of the reel against any part of the magazine indicates a condition to be corrected.

Now test the tension of the friction spring by spinning a fully loaded 2000-foot reel in the magazine. The reel should not run too freely.

Magazine & Takeup Assembly

6. Lower Magazine and Takeup Assembly. It is highly advisable to service thoroughly the lower-magazine takeup assembly of any projector which has been idle for a considerable length of time.

Replace the takeup belt with a new

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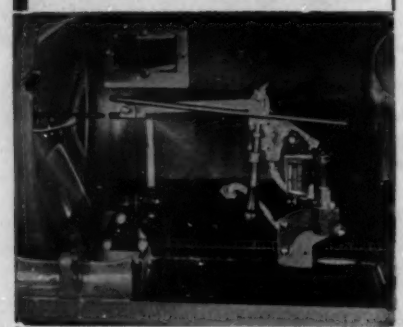

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one, if frayed and oil-soaked. Tighten takeup action. Replace belts having more than one splice or coupling.

Disassemble the takeup assembly. Inspect all parts for wear. Clean and oil the takeup spindle shaft. Scrub the clutch surfaces with carbon tetrachloride and *do not* oil them. Wash dirt and oil from the leather friction disk with carbon tetrachloride, dry thoroughly, *and oil only one side.*

Reassemble the takeup and adjust the tension to the correct degree. This may be done by placing a fully-loaded 2000-foot reel of film in the lower magazine and switching on the projector motor. The reel should indeed turn (start turning of its own accord), but it should also be easily restrained.

7. COMPLETE LUBRICATION. Oil and grease the motor, drive transmission, projector mechanism, and soundhead according to manufacturers' instructions, using the proper type of lubricant in every case. Drain the intermittent well and refill with fresh oil, if this has not already been done. Run-in the projector for 30 minutes and note the "feel" of the machine.

8. AUTOMATIC FIRE SHUTTER. The projectionist should assure himself that the lifting and dropping action of the safety shutter is perfect. When checking this device by switching the motor on and off, *do not turn the motor on while the projector is coasting to a standstill.* In other words, wait until the machine is absolutely motionless before turning the motor on again. Failure to observe this precaution may result in injury to the gears.

(The timing of the occulting shutter, will be left until projection tests are conducted. It suffices for the present to see to it that undue backlash and endplay are eliminated from the shutter shaft, and that all the bearings have received proper lubrication.)

9. MOTOR CHECK. The starting action of the projector motor is an extremely important consideration. A faulty cutout or centrifugal switch must be corrected at this time. All electrical connections are examined — the starting rheostat requiring special attention — and of course, more than a passing glance must be given the motor switch. An unduly loose or otherwise defective switch should be *replaced*, and no attempt made to repair it.

10. FILM-FLOW TEST. This step serves as a final check on the mechanical functioning of the projector.

Thread up the projector with a reel of film and run it off with magazine, mechanism, and soundhead doors open. Observe the flow of the film and the action of all working parts on the film side of the machine. If minor defects are discovered, they are now corrected. The film-flow test also provides an opportunity to ascertain the

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pickup time of the loaded projector.

11. PROJECTION LENS. The projection lens is now carefully cleaned and restored to the projector. For the correct method of cleaning lenses refer to "Coated Lenses: Nature and Care" by A. E. Murray of the Bausch & Lomb Optical Company (IP for February, 1949, p. 7). So comprehensive is Dr. Murray's contribution to this phase of the projection art, that the subject is dismissed here with the oft-repeated admonition;

NEVER "scrub" lenses; NEVER wash lenses in alcohol or other organic solvents! Failure to heed this warning may ruin a fine lens.

Lamp & Ventilating System

12. LAMP AND VENTILATING SYSTEM. The interior of the arc lamp may be so dirty that much time and effort will be required to clean it out. The presence of carbon stubs in the carbon holders is mute evidence of the laxity of the projectionist's predecessor.

If the vent pipes appear to be clogged with carbon dust and oxide fluff, take them down and clean them before cleaning the lamps. In any event, the effectiveness of the ventilating system should be tested long before an arc is struck. Invisible gases produced by electric arcs are highly poisonous.

As a rule, low-intensity get grimier than high-intensity lamps. Oil-caked carbon encrustations are frequently the cause of faulty mechanical action. The roof of the lamp should be cleaned first, and all ash removed from the vent. Then the floor may be brushed free of dust. Grease, graphite accumulations, *etc.*, may be washed with kerosene from the guide rods, feeding screws, and reflector gearing. After cleaning, lubricate all moving parts of the lamp according to the manufacturer's instructions.

Lamp Electrical Units

13. LAMP ELECTRICAL APPLIANCES. Burnish the contact surfaces of the carbon holders. If light filing is necessary, use a magneto file, taking care to preserve the flatness of the surfaces. Then give them a final polishing with crocus cloth. Test the clamping action of the carbon jaws, and give rotating-positive feeds extra attention.

Electrical connections to the carbon holders, are relay, feed motor, *etc.*, must be secure. It is not uncommon for as much as 3 amperes to be lost through faulty carbon-holder lug connections. The lost current is converted into heat which aggravates the troubles by accelerating corrosion of the metal. The condition of the flexible asbestos-insulated cables must also be checked, for these cables, being composed of many fine strands of wire, are particularly liable to oxidation.

The cut-out points of arc relays may be touched up by drawing 00 sandpaper between them while lightly pressing them together. (For routine cleaning use heavy writing paper in

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place of the 00 sandpaper. *Never use emery paper!)*

Check the feed-motor rheostat and then proceed to the feed motor itself. Clean and check the condition of the commutator and the brushes. If the commutator is scored, touch it up with 00 sandpaper followed with writing paper. *Do not use emery paper or cloth on commutators!*

[TO BE CONCLUDED]

C'Scope Lens Price Slash Follows Prismatic Shows

Drastic price reductions in CinemaScope lenses were made during the past month by two major lens manufacturers. Bausch & Lomb and Bell & Howell. These price slashes, amounting to approximately $750 (from $1900) per pair were viewed in projection circles as a move to offer stiff competition to the Tushinsky and Gottschalk anamorphic prismatic attachments shown in New York recently.

Thus, CinemaScope lenses by B & L and by B & H, which, it should be remembered, are *cyclindrical* units, now sell in the $1150 per pair bracket; while the Tushinsky and the Gottschalk units, which are *prismatic* anamorphosers, are in the $700 to $1000 per pair range.

Picture Ratio Vital

Both B & L and B & H emphasize the fact that their CinemaScope lenses will project *all* CinemaScope releases, and that no prismatic anamorphic attachment can convert standard-format films to wide-screen proportions.

This statement was evidently made to correct an impression currently held by some exhibitors that the variable-type anamorphic attachments, such as the Tushinsky unit, can expand any standard print into something like CinemaScope. No anamorphic lens can function except with a print that has been "squeezed" for it.

New Processes Hypo GPC Equipment Sales, Net

General Precision Equipment Corp. net income for 1953 soared to $3,436,349 or $5.09 per share. This is more than double the net for 1952 which was $1,255,278 or $1.88 a share. Net working capital as of last Dec. 31 rose to $18,651,901, or better than $6,000,000 higher than a year earlier.

Sales of picture theatre equipment and supplies by subsidiaries last year were 66% better than in 1952, hitting a record of $22,878,000. Boost reflects the general improvement in the industry plus the heavy demand for new and improved equipment, including the multitrack single film system of magnetic sound reproduction.

Among the GPC subsidiaries are International Projector Corp., National Theatre Supply Co., J. E. McAuley Mfg. Co., Hertner Electric Co., and Strong Electric Co.

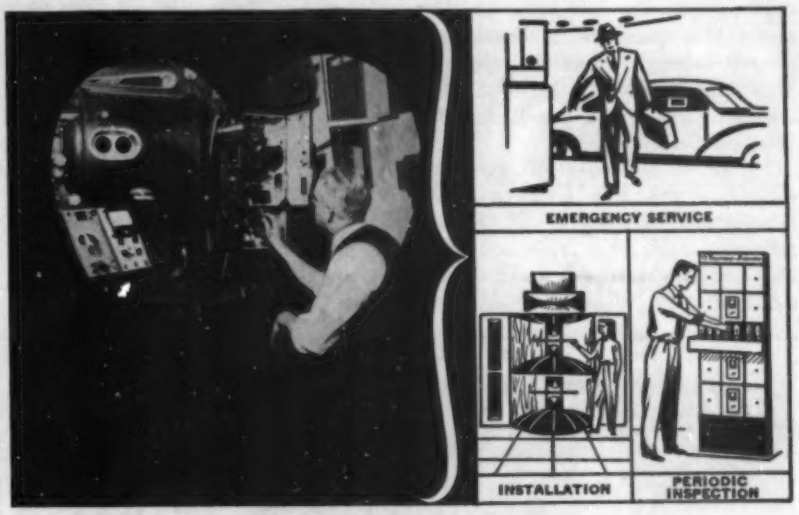
EPRAD Stereosound Car Speakers

The premiere showing of Eprad stereosound car speakers took place April 24 at the Cactus Drive-in, Tucson, Ariz., in connection with the CinemaScope showing of "The Robe" on a 90- by 40-foot screen. Strong Super "135" arclamps provided the projection light.

Two additional wires were buried to provide three sound wires and one common wire to the Eprad stereosound speaker units. The speaker case, which is 10 1/8 inches long and 3 13/16 inches high, is only slightly larger and heavier than conventional speakers, although it contains three 3 1/2-inch driver units. It is made of two-tone Fibreglas and mounts on the rear-view mirror.

Pathe Labs Lecture Series

Pathe Laboratories is expected shortly to launch a series of clinics on a trial basis to give producers, newsmen, critics, and projectionists the opportunity to become better acquainted with the latest developments in color film processing and better understand the role of the laboratory in motion picture production.



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LENSES: Projection Heart

(Continued from page 16)

the speed of the mirror may be reduced until it corresponds with the effective speed of the lens. This expedient reduces screen illumination, of course, but it improves the quality of illumination and decreases heating of the film.

A German Suggestion

Another method has been devised by Zeiss Ikon of Germany, manufacturer of the Ernemann projectors. Instead of increasing the speed of the projection lens or decreasing the speed of the arc-mirror, the light-rays which emerge from the aperture are all directed into the projection lens by means of a special single-element lens placed directly behind the aperture. This special lens is called a *Bildfensterlinse*, a German word meaning "picture-aperture lens."

Figure 4 illustrates diagrammatically how this lens forms a small, intensely brilliant image of the arc-reflector *inside the projection lens*. The special lens is placed as close to the aperture as possible in order to form the smallest possible image of the mirror, insuring that *all* of the light coming from the aperture goes into the lens for projection to the screen.

Picture—Aperture Lens

The "picture-aperture lens" impresses us as a worthwhile contribution to projection technology. Made of special heat-resistant optical glass, it is inserted into the Ernemann projector as shown in Fig. 5.

Actual tests show that this lens considerably increases the brightness of the picture when employed in conjunction with the *Wabenkondensor* lamp (See IP for January 1954). It is evident from Fig. 4 that the *Bildfensterlinse* produces the effect of matching the projection lens with the lamp-optics without requiring the use of lenses of extreme speed and unsatisfactory optical characteristics.

Cleaning of Lenses

A fine lens should be accorded even better care than a priceless jewel. A diamond, being harder than optical glass, better withstands careless scrubbing and scratching! Coated lenses require special thought, if not special care, because the anti-reflection coating

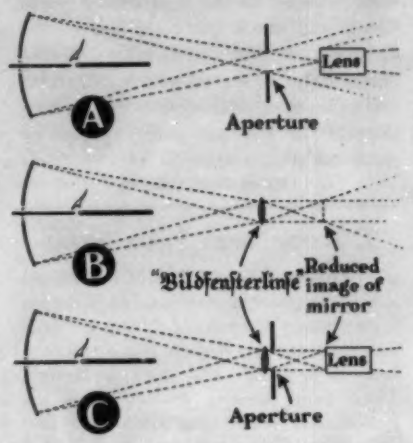

FIG. 4. How the Zeiss-Ikon Bildfensterlinse (picture-aperture lens) defies the laws of optics. In (A) is shown a conventional mirror-aperture-lens projection system. Note that much light is wasted because the lens isn't big enough to intercept all of it. In (B) we see what happens when a small, powerful lens is placed in the lamp beam at aperture distance — an intensely brilliant reduced image of the mirror is formed in mid-air a few inches away from it. In (C) such a "picture-aperture lens" is placed behind the aperture to route all of the light rays into the projection lens. The effect of perfect optical matching is thus cleverly produced without using impractically large projection lenses.

is a film of magnesium fluoride only 1/8000 mm thick — about 800 times thinner than this sheet of paper.

So, even though the coating on a coated lens is somewhat harder than most glasses, it is so thin that it can easily be scratched off. And scratches, as well as fingermarks, oil-spots, and

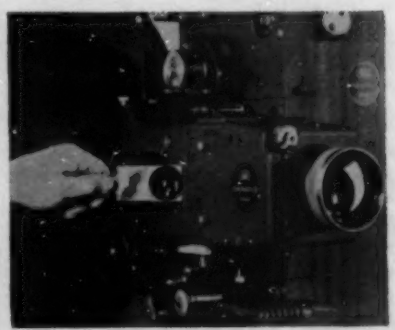

FIG. 5. Projectionist inserting the "Bildfensterlinse" behind the aperture of an Ernemann projector — the picture-aperture lens.

other stains, are extremely conspicuous on a coated lens because they destroy the anti-reflection properties of the coating.

As for removing dirt from lenses, both coated and uncoated lenses

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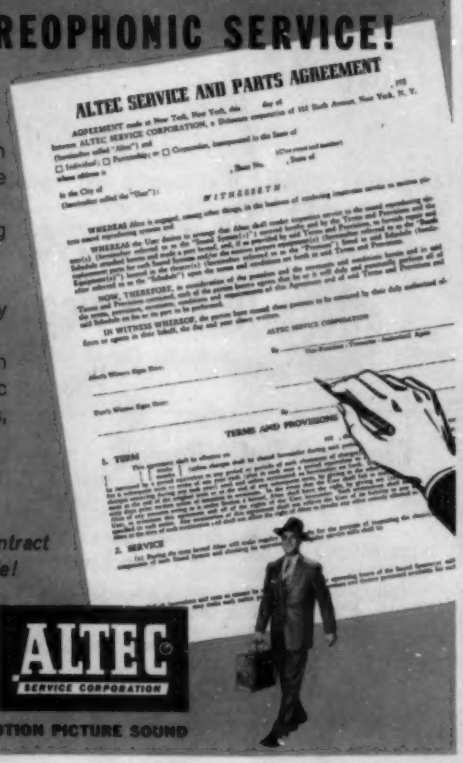

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should be cleaned the same way — with utmost care.

1. DUST. Remove with a soft, dust-free camel's-hair brush of the type used by water-color artists.

2. SURFACE SLIGHTLY SOILED. Breathe on the surface and gently wipe with a very soft, dry linen rag (frequently washed). Breathe on the lens again before each wiping.

3. SURFACE HEAVILY SOILED. Dissolve a piece of Ivory Soap the size of a small pea in a pint of pure (preferably distilled) water to make a weak soap solution. Dampen a clean linen rag with this mild solution, wipe the surface, then polish with a dry linen rag as under (2) above, *breathing on the glass.*

4. OIL ON THE SURFACE. Moisten a soft linen rag with clean gasoline (lighter fluid) and wipe off oil. Continue as under (3) and (2) above.

5. SPECIAL STAINS. *Paint.* Remove cautiously with turpentine, and continue as under (3) and (2) above. *Film Cement.* Remove very cautiously with a half-and-half mixture of acetone and chloroform, and continue as under (3) and (2) above. Apply these powerful solvents very sparingly, and only to the soiled spot, *not* to the entire lens-surface.

WARNING! Use only linen or cotton rags for cleaning lenses, never wool, silk, or rayon, which scratch. Wool also leaves greasy streaks on glass. Do not use "lens-paper" on coated lenses, and especially avoid silicone-impregnated spectacle-cleaning papers.

Use only a soap solution containing nothing but a pure soap, such as Ivory cut from a fresh bar. Never use soap powders or soapless detergents, many of which are adulterated with caustic chemicals capable of attacking glass or dissolving the magnesium fluoride coating.

Warning About Solvents

Never wash lenses with alcohol, acetone, ether, carbon tetrachloride, or similar organic solvents which may seep into a lens and blister the cements with which achromatic couplets are cemented together. Avoid all commercial lens-cleaning nostrums. No attempt should ever be made to take modern sealed lenses apart.

The oftener we clean the mechanisms of our projectors the better they will work; but lenses should not be cleaned more often than is absolutely necessary. A lens can "wear out" only through over-cleaning. Examine the lens daily and clean only the surface which needs cleaning.

In nearly all cases the rear lens facing the aperture gets the dirtiest; the front lens usually having nothing more than a few dust-specks which can be whisked off with a brush. The rear surface is exposed to hot, oily film, and thus gradually becomes fogged by an almost invisible coating of oil-droplets. This oil-film makes the picture dull and hazy; but it is readily removed with the weak soap solution.

Barring accidents, a lens will last almost indefinitely with sensible treatment. One important thing to guard against is the projection of blank light to the screen without having the projector running.

Even though the rotating shutter cuts the light in half, it is unwise to leave the light on the lens too long. The intense heat may blister the Canada balsam or synthetic resin used for cementing the lens-elements together. When high arc-amperages are used, the sudden heat of the full beam on a cold lens may actually crack the rear element. This is especially likely to happen if the lens is covered with a dew of moisture condensed from the air.

[CONCLUSION]

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AS OF THE MOMENT

(Continued from page 10)

try. This view was buttressed by the fact that immediately following the Tushinsky demonstrations in New York the price of the CinemaScope cylindrical lens was drastically reduced from $1800 a pair to $1095 for a small pair and $1195 for a large pair. To the best of our information, the price of the Tushinsky anamorphic attachment will be $700 a pair.

The Gottschalk anamorphic lens attachment unit, which was demonstrated in New York a few days following the Tushinsky exhibition, is a similar prismatic device, and it is quite probable that the considerations enumerated previously anent the Tushinsky unit apply with equal force to the Gottschalk unit.

Single-Track Optical Sound

An escape from the manifold problems posed by the various new processes is offered by the single-track, straightaway optical reproduction system now enjoying the favor of both Paramount and M-G-M, known as VistaVision. We append hereto an official statement by Paramount Pictures Corp. anent this process.

"The position of Paramount is, and has been from the beginning, that any plan developed should be applicable to *all theatres, large or small.* Furthermore, such a plan should not make it *mandatory* for the exhibitor to invest large sums of money in new equipment. . . .

"Paramount is firmly convinced it has the overall answer to the problem of how to improve the presentation of motion pictures and that all exhibitors will be able to afford it. . . .

"VistaVision will be available to *any* and *all* motion picture production companies and can be used by *any* theatre of any size in the world.

"From the beginning, Paramount determined that in the presentation of a motion picture on the screen *HEIGHT* was equally as important as width." (This coincides exactly with the stand taken by IP since the introduction of all these various new processes.—Ed.)

"Therefore, Paramount recommends that every exhibitor install the largest possible screen both as to *height and width* that his theatre will permit. Having done this, the exhibitor will be able to play pictures of any size and ratio he desires.

"VistaVision uses a new camera technique which produces a picture of the highest quality ever seen on the screen.

"The VistaVision camera uses a horizontal double-frame negative to photograph the picture. This double negative photographs images on an area 2½ times the regular 35-mm camera frame. This large negative is then compressed, by printing, to a standard 35-mm frame for release prints.

'Fuzzyness' Drastically Reduced

"This process eliminates grain and fuzziness and provides an overwhelming picture with complete definition of focus and the finest quality picture it is possible to obtain. In addition, the VistaVision camera permits the use of lenses in photographing with an angle varying from 9 up to 75 degrees, and still permits the photographing of scenes without distortion due to the excess ratio of width to height.

"With the VistaVision Process, people and the objects around them can be photographed *as seen by the human eye.* It is not necessary to regroup or diminish the size of actors to meet abnormal limitations of height with respect to width.

"The key words in Paramount's plan are "compatibility" and "flexibility." Under this plan it is optional with the exhibitor as to whether he installs auxiliary sound equipment or not. If auxiliary sound equipment is to be used, it is Paramount's finding that dimensional sound is simpler and less costly in every respect than stereophonic sound and the results are approximately the same.

Sound Reproduction, Cost

"Dimensional sound is from a single sound track on the positive print. This track will be available on Paramount pictures. If an exhibitor desires to use dimensional sound he will, of course, have to install a sound control unit in his projection room—the cost, approximately $1,500.

"Through this system the sound will be directed to three horn units — one at the left of the screen, one in the center and one at the right of the screen. If the exhibitor does not have the horn units available, he will need to purchase these in addition to the sound control unit. This equipment will cost the exhibitor approximately an additional $2,000.

"Prints of Paramount pictures, starting with "White Christmas," will have the directional sound control on the sound track. However, this same print containing the directional sound control can play in any theatre in the normal way."

Honest Endeavor Applauded

IP will never decry any honest endeavor in the technological area which will contribute in even the slightest degree to the welfare of the industry. At the same time we hold seriously to the view that it is our responsibility to report and evaluate in terms of practical application any device which purports to enhance the entertainment value of the projected motion picture image.

When the once-vaunted fifth largest industry in the world requires for the showing of its product to the paying public six projection lenses for the various processes — all for the lack of an agreement on standards — then we have indeed reached a deplorable — nay, desperate — stage.

Out of sheer weariness by reason of constant repetition, IP once more suggests that a meeting of only ten technical personnel (free from the influence of executive "brass") — five from the Coast and five from the East — could within the space of a few hours agree upon and settle finally such matters as a standard aspect ratio, stereophonic sound, *etc.*, which our industry so desperately needs.

SMPTE Convention Starts May 3

A number of papers investigating the early history of the motion picture industry will be read at the 75th semi-annual Convention of the SMPTE, which opens May 3rd and runs for five days at the Hotel Statler in Washington, D. C.

The historical tone will be set by the authors of 15 papers, who for more than a year have combed archives, examined antiquated cameras, projectors and old films for clues that would shed new light on the early history of the motion picture industry. In addition to describing the evolution of modern projectors and cameras, the speakers will examine early successes and failures in the making and processing of film and in the recording and reproduction of sound.

There will also be the usual wide selection of papers on new engineering achievements in the motion picture field. To be reported on are Vista Vision, Perspect-A-Sound, an Xenon-arc projection lamp and a variety of other developments.

Balaban & Katz Goes "Flat"

Balaban & Katz's Chicago Theatre has been equipped with a flat Radiant Astrolite screen 60 feet wide and 29 feet high. This is the second large theatre to announce that it will use a flat screen for CinemaScope. The first was the Radio City Music Hall installation which IP reported on in detail last month.

Balaban & Katz is also installing Raytone screens in the Senate, Central Park, Nortown, Biltmore and United Artists theatres, bringing to 19 the number of B & K theatres equipped for CinemaScope. Eighteen Great States houses are also CinemaScope equipped.

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